U.S. ENVIRONMENTAL PROECTION AGENCY
CURRENT STATE OF BALLAST WATER MANAGEMENT
TECHNICAL DEVELOPMENT DOCUMENT OUTLINE

1. **Introduction**
    a. Overview of why and how vessels add ballast water
    b. Ballast water sources
        i. Freshwater, saltwater, brackish water
        ii. Source locations (Overseas, Coastal, Great Lakes, etc.)
    c. Ballast water impacts
        i. Environmental damage caused by Aquatic Nuisance Species (ANS)
        ii. Socioeconomic damage caused by ANS

2. **Ballast Water Regulations/Requirements to Prevent ANS Introduction and Propagation**
    a. Overview of laws to address ANS
    b. IMO requirements
        i. Limits
        ii. Type certification process and status of revisions
        iii. International ratification and status
    c. EPA/USCG regulations
        i. Ballast water management plans
        ii. Mandatory ballast water management practices
        iii. Ballast water discharge limits
            i. Compliance alternatives (BWTS, onshore treatment, public water supply, no discharge) and exemptions (short-distance, barges, Lakers, small)
            ii. Schedule and status (USCG extension program and EPA low enforcement priority)

iii. Interim requirements

iv. Ballast water treatment system type certification process and status (including number approved, systems in the queue, viability versus dead)

v. Alternative management system acceptance, grandfather period, and status

vi. STEP

vii. Fishing vessels and commercial vessels less than 79 feet moratorium

d. Requirements specific to the Great Lakes

i. Laker BMPs

ii. Ballast water exchange and flushing for overseas vessels (Salties)

e. Requirements for individual states or Indian country lands

3. **Ballast Water Management Considerations**

a. Availability of U.S. type approved ballast water treatment systems

b. Revisions to the ETV protocol for U.S. type approval testing

c. USCG extensions

d. Exemptions for Lakers built before 2009

e. Replacement of IMO type certified ballast water treatment systems

4. **Vessel Universe**

a. Number of vessels impacted by US and IMO ballast water regulations

i. U.S. flagged vessels by vessel type (bulker, cargo, tanker, barges, passenger, etc.)

ii. Foreign flagged vessel by vessel type (bulker, cargo, tanker, barges, passenger, etc.)

b. Characteristics of commercial vessel impacted by US and IMO ballast water regulations

i. Length and tonnage of vessels by vessel type

ii. Average age of vessels by vessel type

iii. Ballast water capacity by vessel type

c. Voyage patterns for commercial vessels impacted by US and IMO ballast water regulations.

i. Vessels entering U.S. waters from overseas

ii. Vessels that remain in U.S. coastal waters

iii. Vessels entering the Great Lakes form outside the EEZ

vi. Vessels confined to the Great Lakes (i.e. Lakers).

5. **Ballast Water Treatment Principals**

a. Treatment system intent

b. Treatment system unit operations

c. Treatment system design consideration

i. Freshwater versus saltwater

ii. Ambient water temperature

iii. Typical voyage duration

iv. Size (space and weight)

v. Power requirements

d. Treatment system operational considerations

i. Operational frequency

ii. Operational complexity (labor, chemicals)

iii. Maintenance requirements

6. **Commercially Available Ballast Water Treatment Systems**

a. Vessel applicability

b. Summary of ballast water treatment systems having AMS acceptance

c. Additional ballast water treatment systems without AMS

7. **Ballast Water Treatment System Performance**
    a. IMO and USCG Type Certification requirements
    b. Summary of IMO Type Certification testing data
    c. IMO Type Certification data quality issues
    d. Long-term performance data

8. **Ballast Water Treatment System Costs**
    a. Capital costs
        i. Purchase and installation of ballast water treatment systems for new vessels
        ii. Purchase and installation of ballast water treatment systems on existing vessels
    b. Annual costs
        i. Labor for ballast treatment system operation
        ii. Energy for ballast treatment system operation
        iii. Chemical costs for ballast treatment system operation
        iv. Monitoring costs for ballast water treatment system operation

9. **Compliance Monitoring**
    a. Sampling considerations
        i. Accessing ballast water tanks
        ii. Volume of ballast water needed for analysis
        iii. Collection of representative samples from multiple ballast tanks
        iv. On-board testing or off-ship laboratory analysis
    b. Analytical methods
        i. Ballast water treatment functionality monitoring

- BWTS sensors

- - Summarize and describe submitted data and data quality

ii. Techniques for measurement of living organisms in ballast water samples

iii. New sensor technologies (e.g., in-line fluorescence, ATP)

iv. Measurement of treatment residuals in discharges (e.g., in-line chlorine sensors)

10. **Off-ship Ballast Water Treatment**

a. Alternatives for off-ship treatment

b. Design considerations for off-ship reception facilities

i. Vessel applicability

ii. Ballast water volume and duration of discharge

iii. Number and location of ballast water reception facilities per port

iv. Freshwater or saltwater discharge

v. On-site treatment or municipal treatment (e.g., POTW)

vi. Environmental conditions (cold climates)

c. Current availability of off-ship reception facilities

d. Costs to construct and operate off-ship reception facilities

e. Practicality of off-ship ballast water treatment including the pros and cons

11. **Ballast Water Alternatives**

a. Permanent ballast

b. On-board potable water generation

c. Ballasting with municipal potable water

12. **References**